DOCUMENT RESUME

ED 039 704   56   EM 008 037

AUTHOR   Coleman, James S.
TITLE   The Role of Modern Technology in Relation to
                Simulation and Games for Learning.
INSTITUTION   Academy for Educational Development, Inc.,
                Washington, D.C.
SPONS AGENCY   Office of Education (DHEW), Washington, D.C. Bureau
                of Research.
BUREAU NO   BR-8-0571
PUB DATE   [70]
NOTE   29p.; This is one of the support papers for "To
                Improve Learning; a Report to the President and the
                Congress of the United States by the Commission on
                Instructional Technology", ED 034 905

EDRS PRICE   EDRS Price MF-$0.25 HC-$1.55
DESCRIPTORS   *Educational Games, Instructional Materials,
                Learning Theories, *Program Evaluation, *Simulation

ABSTRACT
                The use of simulation and games for learning at all
levels of school has grown rapidly in only a few years. In this paper
the author attempts to define what such activities are intended to
do, how they are best used, and what precisely they are. He points
out the differences and similarities between games and simulations.
Some theories of learning are identified which have special
implications for the use of games and simulations. The author
attempts to answer in some detail questions that have been raised
concerning the place of games and simulation in instruction, the
actual learning they produce, and the most efficient ways to use
these techniques in education. A bibliography of groups engaged in
the development of simulation games, and of simulation games that
have been developed, is appended. (JY)

The Role of Modern Technology in Relation to
Simulation and Games for Learning

James S. Coleman *
U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

The use of simulation and games for learning at all levels of school has
grown rapidly in only a few years. Yet there is a lack of clarity about what
such activities are intended to do, about how they are best used, and even about
what precisely they are. I will provide some answers to each of these questions,
beginning with the last.

Simulation

Simulation and games are related but not identical activities. Both
simulations that are not games and games that are not simulations are used for
instructional purposes, along with simulation games. A simulation activity, as
the term is used in instruction, is a re-creation of some aspect of reality in
which students participate as part of the simulation of reality. Simulations
differ from laboratory work in physics, chemistry, or other sciences in that
the system of activities about which students learn involves them directly as
participants, and not as external scientific observers.

Simulations ordinarily involve interaction between different individuals
in various roles, but they need not do so. For example, simulated flight in a
Link Trainer, or simulated driving in a driver-training simulator involves only
the activities of the single student in a mechanically simulated environment. Or

---

* James S. Coleman is professor of social relations at Johns Hopkins University.

a simulation that is widely used for management training, known as the "in-basket" simulation, involves only a single participant in a simulated environment consisting of letters to answer. He has just taken over a new managerial job, and must answer the letters, involving minor and major problems, left by his predecessor. And there are computer simulations such as the "Sumerian game," a simple simulation of economic resource allocation, in which the computer provides information constituting the environment being simulated, and a single individual interacts with this environment by making decisions and transmitting these to the computer.

Single-person simulations, as in the examples given above, are not typical. Most simulations involve a number of persons in roles that require their inter-action. Simulation as a learning activity has some of the aspects of the theater, and some aspects of role-playing. It ordinarily involves a setting in which the participants have specified roles; but it differs from the theater in that the actions are spontaneous rather than pre-determined, and it differs from role-playing in that although the actions are spontaneous, the rules under which action takes place are more fully specified than in role-playing.

A simulation always involves a simulated environment within which each player acts. Sometimes this environment consists wholly of the other players and the rules of the game; sometimes it is incorporated in a computer or other electronic device, or in written materials, as in the examples above. A simu-lation also involves rules of action, which specify the kinds of action which

each player may carry out. Finally it includes a specification of what the goals of each player are, either in very specific terms or in general terms.

It is the last point that differentiates simulations that are games from simulations that are not. The most useful distinction between game-simulations and non-game simulations is in the specification of what constitutes success. In a game, success is well-defined, and there are one or more winners to the game. In a non-game simulation, at the end of the exercise, each participant is in a given position or condition, but there is no explicit comparison of these to determine winners.

Some simulations, in which participants have a single score at the end of the exercise, may be played either as a game or as a non-game simulation. For example, in the Life-Career game, a player at the end of the game has a score, which can be compared to that of other players, or can merely be regarded as his final position, if he is playing alone. Some simulations, however, such as a number of simulations of international relations, or the in-basket simu-lation described earlier, have no final score at all, and the simulation is regarded as an exercise, in which the relative quality of play by different participants is only loosely evaluated, or perhaps is scored as an exercise by an external evaluator, but is not intrinsically structured as a contest.

This discussion of simulation suggests that simulations are directly analogous in the social and behavioral sciences to laboratory work in the natural sciences. In both cases, the simulation or laboratory involves actually setting up a system of behavior, in contrast to having it described in print or

in films or through some other medium of information transmission. The critical difference between the laboratory and the simulation is the role of the student relative to the system of behavior he is studying. In the natural sciences, he must be an external observer and experimenter with regard to the physical, chemical, or biological system of behavior he is studying. In the social and behavioral sciences, the systems of action he studies involve individuals like himself in various institutional settings. Through simulations, he studies this system of action through his own participation in it.*

Games

Games as used in schools include simulation games, but are not limited to them. Some of the most widely used of the new educational games are games of logic, or mathematical games, such as Wff-n-Proof and Equations. Other games, in the social sciences as well as in humanities, mathematics, and the physical sciences, are modifications of drills so as to make a game out of the drill. The classic learning game in American schools is a drill game, the spelling bee.

Despite the fact that games are much broader than simulation games, the essential characteristics of a game have some similarity to the characteristics

---

*It is possible in the social sciences for non-simulation activities to be carried out in which the student is an observer or experimenter, and which directly parallel laboratory work in natural sciences. A neighborhood survey involving interviews is such a laboratory activity, as is the use of census materials for statistical analysis. The curriculum under construction by the American Sociological Association under the title of Sociological Resources for Secondary Schools consists of a set of laboratory activities of this type.

of a simulation. A game first of all involves <u>action</u> on the part of the student, like simulations but unlike many instructional techniques. It has <u>goals</u> for the players, which define the winning of a game. Finally, it has <u>rules of action</u>, which both determine sequence of activities and fix constraints upon the actions of each player, defining what is legitimate action within the rules, and what is not. Unlike a simulation that is not a game, and unlike most other instructional techniques, games are self-initiating and self-sustaining. The enjoyment an individual experiences from a game is such that he will play it quite independently of any desire to learn. The learning occurs as a by-product of the game-playing activity, and need not be a goal at all. An individual does not play chess <u>in order to learn</u> something; he learns to play chess <u>in order to play</u> the game. The interest is in playing the game, and possibly in winning, not in learning.

These characteristics of a game give it great similarity to the characteristics of social life generally. There has, in fact, been speculation by philosophers (1   ) concerning the similarities and differences between life and a game, as well as work by psychiatrists (1   ) describing many activities of life in interpersonal situations as games. It is natural, then, that many simulations, designed to mirror some aspect of social life, are cast as games.

Purely for purposes of definition, then, simulations and games may be defined by these characteristics.

	simulation	game
active participation	X	X
rules governing play	X (loose or precise)	X (precise)
goals of players given	X (loose or precise)	X (precise)
definition of winning and losing		X
abstraction from life activities	X	

Those activities that have both the properties of a game and the properties of a simulation may be termed simulation games.

Assumptions about learning in the use of simulations and games

The use of simulations and games implies some general perspectives about how people learn. Certain of these perspectives are common to both games and simulations, and some are specific to one or the other. Both share the perspective that learning occurs best by active participation of the learner. The implication is that people learn not by being taught, but by acting, and then learning from the consequences of that action. The further implication of this is quite strong: that variations in learning are less dependent on variations in the quality of the teacher than upon the way in which the activity of learning is structured, in particular upon the kinds of actions the learners take and the kinds of feedback they get from these actions.

Both games and simulations imply a sequence of learning in which conceptual learning, or understanding, follows ability to perform rather than preceding it. Much school activity uses the reverse sequence: conceptual learning, which occurs mostly through transmission of information from teacher or books, is attempted first, and performance is seen to derive from that understanding. In a simulation or a game, a student may learn to perform very well in a given decision-making capacity, yet not be able to verbalize what elements go into his action. In learning the same material from books, a student may be able to describe what elements should go into a given decision, but not be able to make such a decision correctly.

Games and simulations as learning environments also imply that for a
person to learn principally through another person in the role of "teacher" may
induce severe distortions of the learning process, particularly in a classroom
with other children. The teacher has a certain relation to the class as a whole,
and to individual children in that class. Each child has a relation to the class
as a whole and to the teacher. Depending on these relations, certain children
may be particularly induced to learn wholly because of the interpersonal relations
while the learning of others may be inhibited for interpersonal reasons. From
the perspective of games, one may regard the classroom situation as a multi-
person game among the teacher and various groups of students and individual
students, a game in which success for some players may not involve learning at
all, or may even be facilitated by rejection of learning. The use of games and
simulations constructed for the purpose of learning assumes that it is better to
establish explicit role relations such that performance in the role requires
learning.

Besides the content that may be learned from participation in a game or
simulation, exponents of game-learning argue that a certain principle or attitude
or belief is learned as well. The principal or attitude or belief may be
described as a belief in the predictability and responsiveness of one's environ-
ment, a belief that arises by learning through the responses of an environment.
This belief in "control of environment" or "efficacy" or "responsiveness of
environment" has been found to be highly related to measures of ability and
school achievement. The use of games or simulations is designed to strengthen

such beliefs, through the very mode by which learning occurs: his action and the contingent response of those in his environment. The aim is for learning to occur through the construction of simulated environments or game structures that are in fact responsive to his actions, with his success contingent upon his actions.

The use of simulations for learning involves specific assumptions about the kinds of things it is necessary to learn in social studies, and how they may best be learned. The general thesis is that the adult world will involve types of interactions and activities much more complex than those he presently faces, and he can best learn about these through simulating the activities before he confronts the real ones. In particular, the adult world is far more role-segmented than a child's or adolescent's world, and is much more impersonal, involving a higher proportion of interactions with institutions and organizations than he ever confronts as a child or adolescent. Through simulations, the child or adolescent experiences these complexities in trial form before confronting them in real life, and thereby is better prepared to cope with them in real life.

In addition, simulations often place an individual in a role he will never inhabit in real life: a role in a simulation of an historical episode, or a role as a Congressman or labor negotiator or business owner. The thesis behind such simulations is that they allow the child, and subsequently the adult, to understand the functioning of aspects of society from a perspective other than his own, to comprehend what he would otherwise see as inexplicable actions on the part of persons far distant from him.

Thus simulations are designed to provide a means for exploring the complexities of society in relative security, small segments at a time, as a means of improving one's subsequent performance in it and understanding of it. Simulations are designed to extend the natural mode of learning by experience, which is the principal way one learns outside school, beyond the direct experiences the child, or even the adult, is likely to have. They represent a natural extension of Dewey's ideas about learning in close conjunction with the community and with life. They differ from Dewey's ideas in that Dewey's conception of the community was a close interpersonal environment. Social simulations as currently being developed and used are based upon a conception of society as composed of complex institutions, and of life as including activity in the framework of such institutions, and including interactions with impersonal organizations as well as persons.

In addition to the common learning assumptions of games and simulations, a principle underlies the use of games, somewhat as follows: learning is appropriately a by-product of activity directed to another goal. One is seldom motivated to learn merely for learning's sake alone, nor is there any reason to be. Outside school, in natural learning environments, one learns because he wants to succeed or accomplish some action in that environment. In the artificial learning situation of the school, he learns in order to get good grades, to please his parents, and to escape failure in school. In games and simulations, he learns, much as in the natural learning environment, in order to succeed at his goal in the simulation or the game, a goal that is more intrinsically connected to the learning than are the grades which are often his goal in school.

With this general orientation, the usual question about "motivation to learn" are inappropriate. Motivation to learn is intrinsic, deriving from motivation to succeed in the game. The only problem of learning is a problem of facilitating or aiding the players to learn that for which the game structure itself, substituting for the real life structure in natural learning environments, motivates them.

If this general aim is to be realized, it is evident that those things it is desired to learn must be necessary to the play of the game. Since the principal aim of a player is success in the game, then the player will bypass or neglect those matters that in a more exploratory mood he might have stopped to examine. It may well be that the play of the game will increase his general level of interest in those matters on which the game focusses, leading him to subsequently explore them (as, for example, the game of baseball develops among former players an intense interest in a variety of ancillary details, statistics, and rituals. But this extension of interest and learning is a secondary effect rather than a necessary consequence of play.

Questions and problems in the use of games and simulations in learning

The preceding section indicated the general assumptions behind the use of games and simulations for learning, but it said nothing about the unresolved questions and problems involved in their use.

What do games and simulations actually teach? The simple answer to the

question of what games and simulations that have been designed for learning

actually teach is that the evidence is very unclear. There are a few examples

of quite spectacular gains from the use of non-simulation games and drill games.

Also, there have been comments by observers describing spectacular changes in

interest levels in the use of simulation games, as in the following extract from

a letter written by a teacher in an Indian school.

> Thank you for forwarding your games; Game of Democracy and
> Life Careers. You requested that we report how the games worked in
> the Sioux culture.

> The results were astounding. Boys who had dropped out of high
> school the year before patiently went through the long explanation of
> how to play and then threw themselves into the game. One even asked
> if he could stay after school to continue the game (even though this
> same day he had earlier spoken about dropping out of school). Kids.
> who I had never observed smiling suddenly lit up as they bargained
> with their classmates.

Apart from such testimonials, and the enthusiasm of game designers,

quantitative evidence of <u>information learned</u> shows some learning in some

experiments, but far from universal and instant success. The near-universal

success has rather been in <u>motivation</u> and general enthusiasm of students and

teachers, as exemplified by the above quotation.

There is a serious problem in testing the effectiveness of games and

simulations as learning environments, due to one fact: as described earlier,

games and simulations attempt to induce performance learning as distinct from

conceptual learning. Yet most testing in schools (except in mathematics, where

testing ordinarily involves problem-solving), is testing of conceptual learning,

as exhibited by the ability to answer specific questions. Such tests are not necessarily good measures of performance learning, though they are good tests of the conceptual learning that occurs with most instructional methods in schools.

Most of the testing of effectiveness of games and simulations for learning has attempted to make use of paper and pencil tests of conceptual learning or knowledge. In doing this, a number of problems have arisen. First, as is true in social studies generally, there has been lack of clarity about what the game or simulation is designed to teach. Secondly, it is unclear how to translate the performance learning aims of games and simulations to conceptual learning tests. For example, in a consumer economics game, the aim is to improve the player's ability to use credit wisely. But the test that would ordinarily be used is a test of knowledge about use of credit. Obviously, if this knowledge is taught directly, through traditional methods, and students are sufficiently motivated to absorb the information presented, the traditional methods will be more efficient in transmitting the knowledge required to answer the test questions. What is required for testing is a simulation itself, which requires performance in a problem-solving situation.

The question of whether games and simulations teach values or facts depends very much on how the game or simulation is constructed. In every game or simulation, the rules define the structure of relations, and in some cases they also define the returns contingent on particular actions. Values of the game designer may very well be reflected in these rules, and the game or simulation thus teach the values of the designer. While some arbitrary decisions in scoring must in any case be made, the arbitrariness is greatly reduced if the

designer has carried out careful research on the constraints inherent in each role being simulated.

A few simulations in which this has not been done appear designed principally to demonstrate who are the "good guys" and who are the "bad guys." In addition, some simulations with very little structure beyond the definition of particular roles may simply constitute a framework for the participants' to act out their own values. These simulations appear to be of little aid in teaching, for rather than giving the participants a new perspective on reality, they merely reinforce the participants' existing perspectives. They appear to destroy one of the principal virtues of games and simulation, which is to show that simple judgments which divide reality into "good guys" and "bad guys" are often mistaken. In fact, it may be that one of the rough indicators of a good game or simulation in social science is that insofar as it does affect values, it reduce value consensus among the set of players rather than increase it, strengthening minority positions within the set of players relative to those held by the majority, through the diversity of perspectives it generates.

There are several criteria for helping to insure that a game or simulation does not simply teach the designer's values. One is that the rules and other conditions confronting each player should not include anything about the personality of the player, but only the conditions, internal and external, that confront him as an actor. The player must be free to choose his own course of action within the set of constraints imposed by the game. The rules of the game tell him what his interests as a player are, and what he cannot do, but he himself determines how to act in pursuit of those interests. If the constraints themselves

are grossly biassed and are a caricature of reality, this is often evident

simply from a reading of the rules.

A second and related criterion which the game designer himself can apply,

is that each role be treated "from the inside," so to speak, that is, sympathe-

tically. It is much as in the design of a novel or a play: each character in

a good novel should be motivated, not merely a stooge to serve the author's

purposes.*

Several points concerning what games and simulations teach have become

clear in their use to date. These are:

1. Games and simulations elicit far more involvement and effort, over

extended periods of time, than do most other modes of learning. The increase

in effort appears not to be merely a Hawthorne or novelty effect, but to inhere

in the competition to succeed or to improve one's relative position - the same

motivation that leads people to play games on their own for no purpose other

than pleasure.

2. Games and simulations constitute especially intensive experiences

compared to most school activities. Players who have played a learning game or

simulation often remember it much later, after most other school activities are

forgotten. This intensity may be a consequence of the interpersonal involvement

---

*In a novel or a play, it may be necessary, to prevent extreme complexity,
that some actions are unmotivated and carried out by "wooden" or "two-dimen-
sional" characters. Corresponding to this in simulation games are actions that
are not carried out by players, but are hypothetically carried out by others
outside the game, and are part of the rules: the outcome of a chance card, a
spinner, or a fixed rule. For example, in a legislative game, the players are
legislators. Their actions are part of the game, but their constituents' actions
(in voting for or against them) are determined through the rules, together with
the distribution of cards representing constituents.

which arises in play, but it also may result from the intensity of concentration and attention focus that occurs during play. The latter is suggested by the fact that hard-fought play of games like chess, in which unstructured interpersonal interaction is severely limited, is also vividly remembered by the players.

3. The mere play of a learning game or simulation without discussion may teach little or nothing. Observation indicates that though play of a game sometimes stimulates the player to think, some players simply play mindlessly, with little attempt to gain insight from play. Such players appear to require discussion in order to grasp the fact that one can use the experience of play to gain insights about better play. (This "mindless" play on the part of some players, which can be changed through discussion, may offer a way of studying why some persons do not learn from experience in real life - for it is quite clear from observation that depending on the attitude with which one approaches a game, he may learn much or almost nothing from the experience of playing it.)

4. The use of a game context for information drills is very effective for learning the information contained in the drills, apparently because of the effort that games induce.

5. The extended play of some games of logic and mathematics does improve performance in mathematical or logical tasks.

6. Games and simulations employ different sets of motivations than instructional methods which involve teaching. This is evident in the fact that children regarded as slow learners, unmotivated, and disadvantaged, are as

highly motivated in games and simulations as are those who are ordinarily high performers in school. It is also evident in observations that persons who are outstanding or become leaders in simulations and games are often not those who are the highest performers in school. This result indicates that games and simulations may be especially valuable for learning among disadvantaged children.

The source of this difference between methods of instruction that involve teaching and games and simulations may lie in either of two structural differences: first, the fact that the social organization of the classroom with games and simulations does not depend on a teacher-student relation, and is very different from the teacher-oriented classroom. Second, learning occurs through performance and activity, from which conceptual principles are inferred, rather than by a direct conceptual transfer from teacher to student. If the poor performance of a student in present school activities is because he learns more through action and less through direct intellectual digestion of abstract information, then he can be expected to learn better through games and simulations.

7. The amount of chance in a game is quite important for the amount of learning to be derived from it. If a game is pure chance, as in gambling casinos, obviously there is nothing to be learned beyond the mechanics of play. If a game contains no chance, then ordinarily players must be very carefully matched in order to equalize the opportunity to win. (One exception to this point may be some social simulation games involving much interaction of a cooperative as well as competitive sort among players. The chance element involved in such

interaction may substitute for formal chance mechanisms in play.)

Thus in games used explicitly for learning, the amount of chance should be at some intermediate level, enough to encourage learning of skill at play, but not enough to discourage play between players of unequal strength.

How are games and simulations best used for learning?

Some learning games, such as certain mathematical games, are played quickly, and can be played over and over by the same players. At the other extreme, some simulations, best exemplified by some of the international relations simulations, are very elaborate to stage, are ordinarily played only once by a given group of participants, and may last several days running.

These are constraints imposed by the particular games and simulations themselves. But apart from these constraints, most games and simulations may be used in a variety of ways, in the classroom and as extra-curricular activities. In order to obtain an idea of the conditions most conducive to learning through games, it is useful to distinguish different types of learning or types of change in individuals that can take place through the use of games and simulations.

1. The first and most universal learning that takes place is learning of the rules of the game, including the structure of action. This learning is necessary in order to play, and thus is intrinsic to play of the game or simulation. In some simulations, the rules of play are themselves complex, and represent some facet of reality. For example, some realistic legislative simulations have included as part of the rules the rules and procedures of the U.S.

Congress. The learning of these rules themselves is one of the goals of the simulation.

In some cases, the rule-learning is explicitly recognized through creating different levels of the same game, which differ in the complexity of their rules. At the first level, the rules embody certain social, economic, or political processes (or in mathematical games, certain mathematical operations). At higher levels, the increasingly complex rules show a more complex set of processes or operations.

Rule-learning, it should be noted, is learning that occurs in part prior to the play of the game itself, and in part during play, through trial and error. Because much rule-learning takes place before the game, it is important to so structure learning games that play can occur with a minimum of rule-learning. This may be accomplished by having the game playable at several levels, with the first levels requiring very little prior rule-learning.

2. A second kind of learning is the learning of behavior strategies in unfamiliar circumstances. Such learning, whether or not it generalizes to behavior strategies in general, develops the behavior strategies in areas of life simulated by the game. This kind of learning is the learning that many simulation games are designed to teach. The aim is to give a player an understanding of, and experience with, the behavioral alternatives that would confront him in real life in the role that he occupies in the game. This learning can range from very explicit behavior strategies to a much more intangible way of looking at a set of events from a new perspective.

It is because of this kind of learning that simulation games ordinarily deal with future activities the individual will face (such as a life career game, which gives experience with the kinds of career decisions to be faced in the future), or with activities involving complex institutions that he might otherwise never gain insight into.

3. A third kind of learning that game and simulation designers often aim to bring about is an increased knowledge of actual detail of one's social environment. Some games and simulations are rich in the realism of the setting, and this richness becomes a part of the experience of the player. Not all games and simulations attempt to re-create the factual details of reality, but for those that do (which include simulations of historical events), the aim is to bring that richness into the player's experience.

4. A fourth learning aim of some games is the aim of developing a general sense of behavior strategies, that is, of setting a goal and devising the most efficient means for realizing it. A number of game developers argue, as indicated earlier, that the play of simulation games induces a young person to believe that his environment is responsive to his efforts. There are some strong indications from other research that such a belief is highly related to learning skill. Thus these game developers argue that the responsive environments that games provide will help develop such a belief and thereby improve general learning ability.

5. A general kind of learning about cooperation and competition, about give and take, takes place in many social simulation games. Social processes

in reality and in the simulation games involve competition through cooperation, transactions of mutual benefit to both parties, acceptance of temporary disadvantage in the hope of future benefit, and other activities that are neither pure gain nor pure loss. Learning these social processes does not automatically occur to young people in the artificial role of student. In the past, a greater learning of them occurred when children were a more functional and productive part of a household economy, when their roles were not restricted to those of "student" and "adolescent."

In determining how best to use games or simulations to bring about one or more of the types of learning described above, it is useful to recognize a general principle: that one of the major reasons games teach is the intensity of concentration they induce. Thus any use of games that discourages this intensity of concentration for some or all participants will not likely result in much learning. One of the most widespread current uses of games is a use of this sort, in the regular classroom as an adjunct to the regular curriculum. When used as an adjunct to the regular curriculum, a game or simulation is ordinarily played as an interlude to usual classroom activities, followed by a discussion of the game. Such use has the severe limitation that the game may be regarded as an interlude to the "work" of learning itself, so that the only learning which occurs is that necessary for a casual play of the game, principally the rules of the game.

Even when not used as a mere adjunct to the curriculum, a frequent use of games or simulations is play only once or twice by a class or other group. When

played once or twice, there is little incentive for learning behavior strategies, and often a general confusion about the relation between one's action and the results of that action. A common result after a single play of a game is that some players understand well what went on;, and are ready to begin developing strategy, while others are totally confused. Learning of types 2 and 4 described above appears unlikely to occur under such conditions of play.

It seems clear that for maximum benefit, a game or simulation should be the object of sustained and serious play. This may occur either in the curriculum itself or in extra-curricular activities. In either case, but particularly in extra-curricular play (such as in tournaments or interscholastic play) there is an inherent conflict between the need to continually extend the game to higher levels to broaden learning of types 1 and 3 and the need to fix on a single set of rules for competitive play to enhance learning of types 2 and 4.

Another question about the best use of games and simulations for learning is in the role of modern technology, such as computers, in relation to games. Computer games exist, best exemplified by computer management games used in some business schools, but including also a few games at the high school and elementary school level. Several points emerge from the use to date, some encouraging to the combination of computers and simulations or games, and some discouraging.

First, the computer can constitute a very flexible responsive logical environment, and it is the essence of simulation games that they involve simulated responsive environments. But second, when the computer is used as a

substitute for other players in a <u>social</u> environment, much of the instructiveness of that environment is lost. Where the number of other players would be too large to feasibly enter the play of a game (as consumers in a management game, or voters in an election campaign management game), then the computer may usefully take their place; when this is not so, the computer is ordinarily more hindrance than aid.

Altogether, it is very likely that computers and allied technical aids will come to play a valuable but limited role in augmenting the environments that simulations and games provide. The more rich in factual information the game or simulation, the more useful the computer is, in serving up that information. And as input-output media for computers develop, the environments provided by the computer will become more usable in games and simulations. Nevertheless, it is easy, in speculation on the technological marvels of the future, to overestimate the role that such technology will play in simulations and games. Just as the invention of moving pictures enlarged the possibilities for drama, but the possibilities are realized only with a structurally sound screenplay, technological innovations will enlarge the possibilities for games and simulations, but the possibilities will be realized only with structurally sound games and simulations.

A bibliography of groups engaged in the development of simulation games, and of simulation games that have been developed is reproduced below. Both parts of the bibliography are taken from ~~Ralph~~ William Nesbitt, <u>Simulation Games for the Social Studies Classroom,</u> Foreign Policy Association, New York, 1968.

<center>Bibliography</center>

<u>Resource Persons and Organizations</u>:

Abt Associates, Inc.
55 Wheeler Street
Cambridge, Massachusetts 02138

Game designers for many educational, business and governmental organizations.

Academic Games Director
Nova High School
3600 Southwest 70th Street
Fort Lauderdale, Florida 33314

Nova High School has been a center for the development and use of TRADE AND DEVELOP and others. Sponsors the Academic Olympics.

The Didactic Game Company
Box 500
Westbury, New York 11590

Designers of games for education, business, and industry.

Foreign Policy Association School Services
H. Thomas Collins, Regional Director
345 East 46th Street
New York, New York 10017

Developed DANGEROUS PARALLEL with Abt Associates. FPA has also been working on simulations with large groups through television.

Interact
P.O. Box 262
Lakeside, California 92040

Two teachers, Paul DeKock and Dave Yount, have organized Interact to
produce and disseminate simulation games, such as DISUNIA and SUNSHINE.

Academic Games Project
Center for the Study of Social Organization of Schools
The Johns Hopkins University
3505 N. Charles Street
Baltimore, Maryland 21218

The Johns Hopkins groups have developed a number of educational games,
including THE GAME OF DEMOCRACY, PARENT-CHILD, and POOR PEOPLE's CHOICE.

Joint Council on Economic Education
1212 Avenue of the Americas
New York, New York 10036

Have been working extensively with economic simulation games. Bibliography
available.

Urban Systems Simulations
Washington Center for Metropolitan Studies
1717 Massachusetts Avenue, N.W.
Washington, D.C. 20036

Designers of such games as REGION and CITY.1. The Gaming Newsletter,
sponsored by the National Gaming Council, may be ordered from the Washington
Center for Metropolitan Studies at $4.50 for 4 to 6 issues per year.

Project SIMILE
Western Behavioral Sciences Institute
1150 Silverado
La Jolla, California 92037

WBSI has designed such games as CRISIS, NAPOLI and PLANS. Their
Occasional Newsletter on developments in simulation may be ordered for $5.00
per year.

Some Simulation Games:

CARIBOU HUNTING (5th Grade)

A board game (map) simulating some of the difficulties Eskimos experience
in hunting caribou. Presently available only within trial teaching edition of
"Man-A Course of Study," a 5th grade course. This social studies course

expected to be published commercially in 1969-70. For information about the course, write Librarian, Education Development Center, Inc., 15 Mifflin Place, Cambridge, Mass. 02138.

CITY 1 (Senior High-Adult)

Involves various social, economic and political relationships in a simulated urban center and its three suburbs and includes an integration of systemic and role-playing approaches. For information write Peter House, Director, Urban Systems Simulations, The Washington Center for Metropolitan Studies, 1717 Massachusetts Avenue, N.W., Washington, D.C. 20036.

CONSUMER (Senior High-Adult)

Designed to teach something about the proble₁ ₁d economics of install-ment buying. Information available from Academic Games Project, Center for the Study of Social Organization of Schools, The Johns Hopkins University, 3505 N. Charles St., Baltimore, Md. 21218. Available 1969. (1st edition out of print.)

CRISIS (Senior High-Adult)

A simulation of an international crisis over a mining area of vast importance to the world. Available from Project SIMILE, Western Behavioral Sciences Institute, 1150 Silverado, La Jolla, California 92037.

DANGEROUS PARALLEL (Senior High-Adult)

A simulation in which students play ministerial roles for six fictionalized countries facing a situation approximating that which led to the Korean war. A principal objective is to teach students about some of the factors involved in foreign policy decision-making. Available in the spring of 1969 from Scott-Foresmen and Co. (Att: Mrs. Mariette Stieg), 1900 E. Lake Ave., Glenview, Ill. 60025.

DEMOCRACY (Junior High-Senior High)

Simulates some aspects of the legislative process of the United States Congress. Available from Academic Games Project. (See Consumer.)

DISASTER (Junior High-Adult)

Simulates some problems faced by individuals when a community is hit by a localized natural disaster. Information available from Academic Games Project. (See Consumer.) Available, 1969. (1st edition out of print.)

DISUNIA (Junior High-Senior High)

Students attempt to cope with problems of the kind Americans faced in the period 1781-1789 through divisions on a new planet in the year 2087. Available from Interact, P.O. Box 262, Lakeside, California 92040.

DIVISION (Junior High-Senior High)

A simulation of various problems facing Americans in the 1850's, including slavery. Available from Interact. (See Disunia.)

ECONOMIC DECISION GAMES (Senior High)

A series of eight games with teachers' guide, in which students are involved in analyzing and solving economic problems. The series includes: THE MARKET, THE FIRM, COLLECTIVE BARGAINING, THE COMMUNITY, SCARCITY AND ALLOCATION, BANKING, THE NATIONAL ECONOMY and INTERNATIONAL TRADE. Available from Science Research Associates, Inc., 259 East Erie Street, Chicago, Illinois 60611.

ECONOMIC SYSTEM (Junior High-Senior High)

A simulation of the interrelationship of various elements in the economic system, including manufacturers, workers and farmers who try to advance their economic positions. Information available from Academic Games Project. (See Consumer.) Available 1969. (1st edition out of print.)

THE GAME OF EMPIRE (Junior High)

A game modeled on mercantilism and economic factors involved in British subjects becoming Americans. Presently available only within trial teaching edition of "From Subject to Citizen," an 8th grade social studies course. Course expected to be commercially published in 1969-70. For information about the course, write Education Development Center. (See Caribou Hunting.)

FARMING (Senior High)

Players assume the role of a farmer in Kansas during three different periods in American history, beginning in 1888. Available only as part of a unit on "Agriculture and Manufacturing" from the High School Geography Project, P.O. Box 1095, Boulder, Colorado 80302.

INTER-NATION SIMULATION (Senior High-Adult)

A simulation of international relations, including the interrelationship of domestic and foreign policy. This school version of the original Northwestern University INTER-NATION SIMULATION is available from Science Research Associates. (See Economic Decision Games.)

LIFE CAREER (Junior High-Adult)

A simulation of certain features of the labor market, the "education market" and the "marriage market" in which players work with a fictitious person, alloting his time and activities among school, studying, a job, family responsibilities and leisure time. Write Academic Games Project. (See Consumer.)

MARKET GAME (Upper Junior High-Senior High)

Simulates aspects of the free market process. Part of Comparative Economic Systems, Holt Social Studies Curriculum, Edwin Fenton, editor, Holt, Rinehart and Winston, Inc. 383 Madison Avenue, New York, New York 10017.

NAPOLI (Junior High-Adult)

A simulation of the legislative process and its interrelationship with parties, Available from Western Behavioral Sciences Institute. (See Crisis.)

PANIC (Junior High-Senior High)

Students play the roles of members of economic pressure groups in the United States in the period 1920-40. Available from Interact. (See Disunia.)

PARENT-CHILD (Junior High-Adult)

Simulates interrelationship of parent and child as they bargain over the limits of permissible behavior and attempt to achieve maximum satisfaction. Write Academic Games Project. (See Consumer.)

PLANS (Senior High-Adult)

Players assume the roles of members of interest groups who try to use influence and produce change in American society. Available from Western Behavioral SciencesInstitute. (See Crisis.)

POINT ROBERTS (Senior High)

Students play roles of Canadians and Americans in a simulation that
approximates the way in which a boundary dispute might arise and be settled.
Available in September 1969 as a part of a unit on Political Geography from
the High School Geography Project. (See Farming.)

POOR PEOPLE'S CHOICE (Formerly GHETTO- Junior High-Adult)

Simulates economic and social mobility in a poor inner city neighborhood;
also simulates the interaction of the neighborhood and the individual. Will be
available in 1969. For information write Academic Games Project. (See Consumer.)

REGION (Senior High-Adult)

Through economic and political decisions and inter-team conflicts and
compromises, participants obtain an interdisciplinary view of the problems of
a growing urban region. For information write Urban Systems Simulations.
(See City 1.)

SEAL HUNTING (5th Grade)

A board game simulating some Eskimo strategies for securing enough seals.
These include sharing patterns as well as technological strategies. Presently
available only within trial teaching edition of "Man: A Course of Study," from
Education Development Center. (See Caribou Hunting.)

SIERRA LEONE (Elementary)

An experimental, computer-based game in which the student assumes the role
of an American economic adviser attempting to improve various aspects of the
economy in different parts of the country. This game is being experimented with
at the Board of Cooperative Educational Services (BOCES), Westchester County,
Yorktown Heights, New York 10598, and is demonstrated by appointment.

SIMULATION: THE DECISION-MAKING MODEL (Senior High)

Students play the role of decision-makers for five hypothetical countries
with a wide range of resources and seek to improve their nation's domestic and
international position. Developed by and available from the World Affairs
Council of Philadelphia, John Wanamaker's Store, 13th and Market Streets,
Philadelphia, Pa. 19107.

THE SUMERIAN GAME (Elementary)

An experimental computer-based game in which a player assumes the role of ruler of Sumeria (an agricultural economy) and must improve the lot of his people by making decisions. (See Sierra Leone for address.)

SUNSHINE (Elementary-Senior High)

Students become members of different races in a mythical city and face various urban problems, including segregation. Available from Interact. (See Disunia.)

TRADE AND DEVELOP

Simulates the processes of international trade and economic development as players make decisions about production, trade and investment. Will be available in 1969. For information write Academic Games Project. (See Consumer.)